Mapping Seasonal Freeze/Thaw Processes in Alaska with NSCAT

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AGU'98 Special Session OS19: "Scientific Application of Observations from Spaceborne Scatterometers"

Landscape freeze/thaw transitions coincide with marked shifts in albedo, surface energy and mass exchange, and associated snow dynamics. Monitoring landscape freeze/thaw dynamics would improve our ability to quantify the interannual variability of boreal hydrology and river runoff/flood dynamics. The annual duration of frost-free period also bounds the period of photosynthetic activity in boreal and arctic regions thus affecting the annual carbon budget and the interannual variability of regional carbon fluxes. In this study, we use the NASA scatterometer (NSCAT) to monitor the temporal change in the radar backscatter signature across Alaska. We have measured vegetation tissue temperatures, soil temperature profiles, and micrometeorological parameters *in situ* at selected sites along a north-south transect extending from Prudhoe Bay to the Kenai Peninsula. Data from these stations have been used to quantify the scatterometer's sensitivity to freeze/thaw state in a variety of terrains and land cover classes. Analysis of the NSCAT temporal response over the 1997 spring thaw cycle shows a 3 to 5 dB change in measured backscatter that is well correlated with the landscape springtime thaw process. Having verified the instrument's capability to monitor freeze/thaw transitions, regional scale mosaicked data are applied to derive freeze/thaw transition maps for Alaska. These maps are compared with gridded meteorological parameters derived from the surface weather station network.

This work was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under contract to the National Aeronautics and Space Administration.